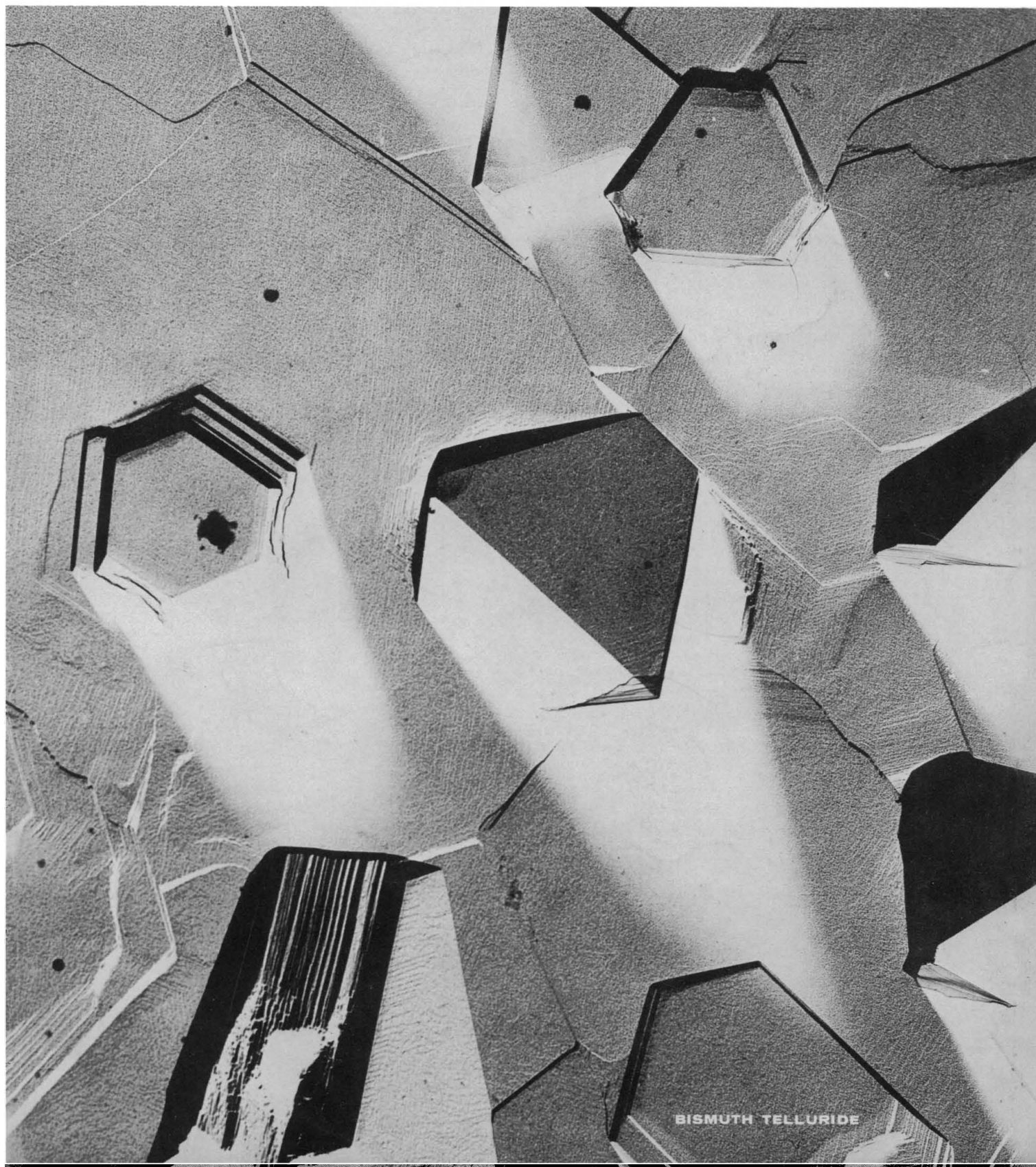


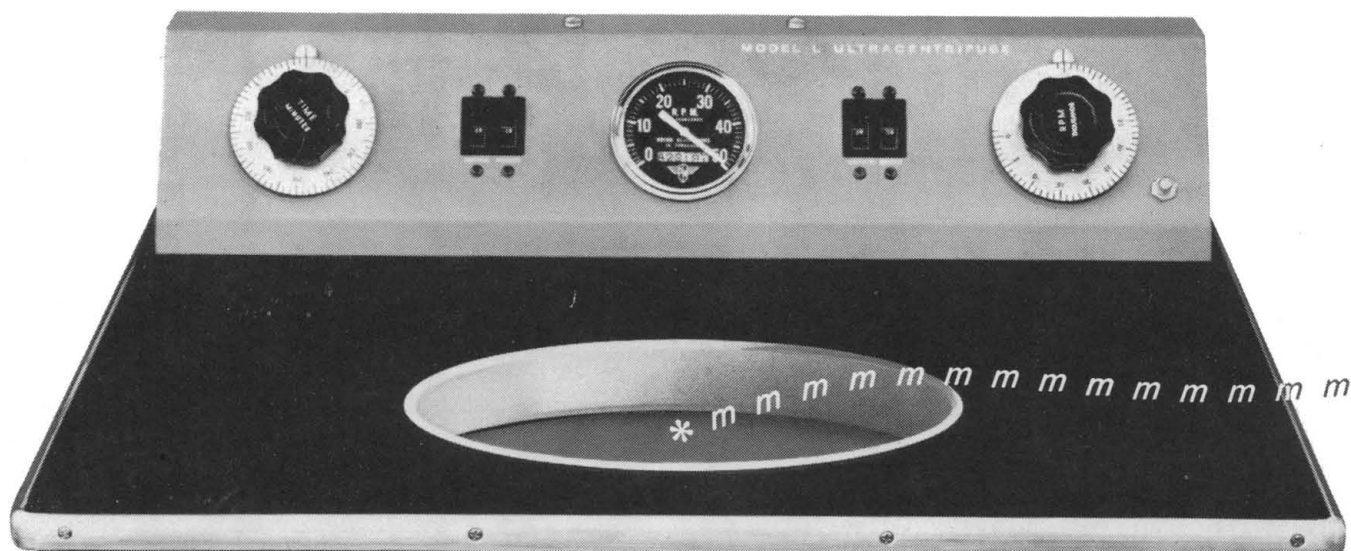
SCIENCE

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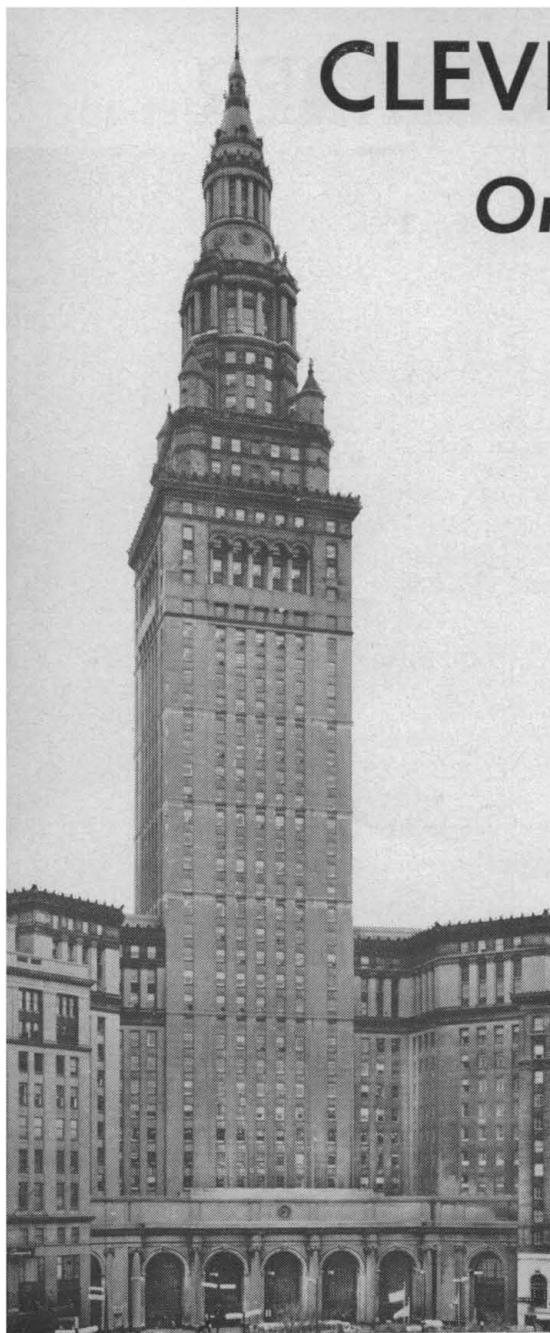
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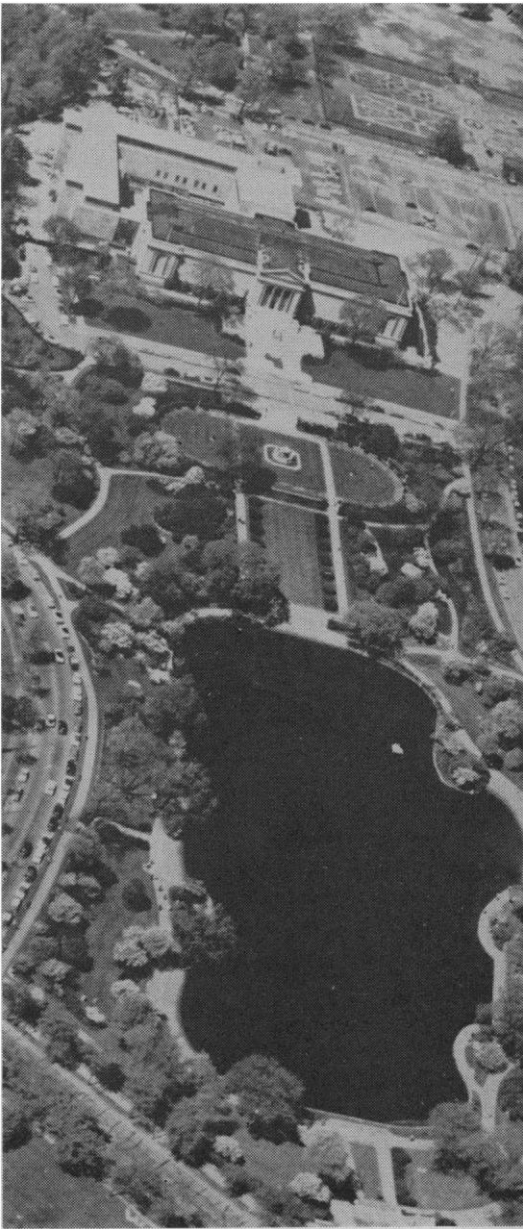
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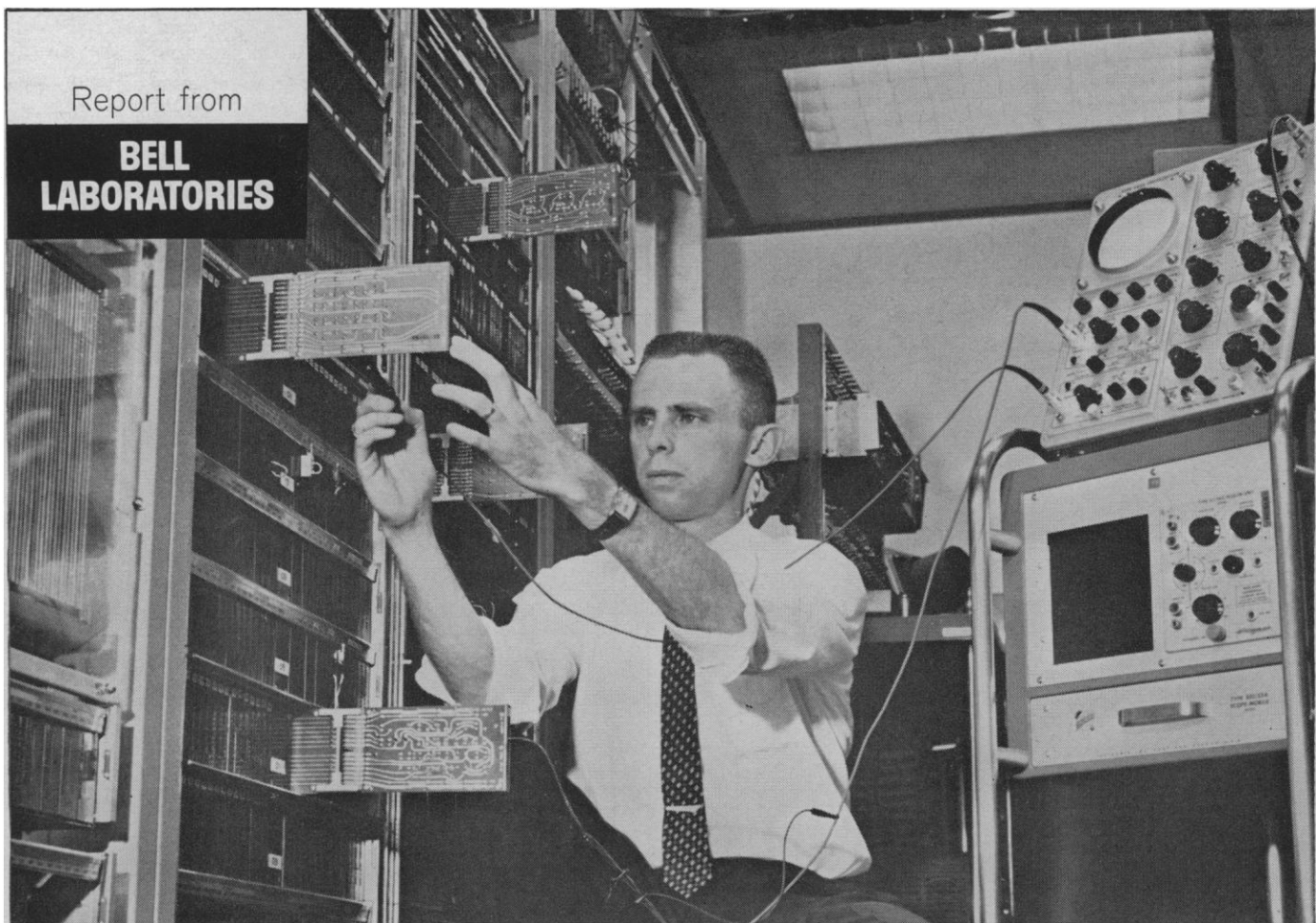
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each office, but in that time it determines what has to be done and arranges for the necessary actions.

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The new switching system operates compatibly with existing electromechanical switching systems in the Bell System. Such Bell Laboratories inventions as the transistor are indispensable to its compactness and the high reliability of its operation. The system was developed for use by businesses as a private branch exchange, and a model has been installed by Western Electric for trial by two New Brunswick, New Jersey, companies.



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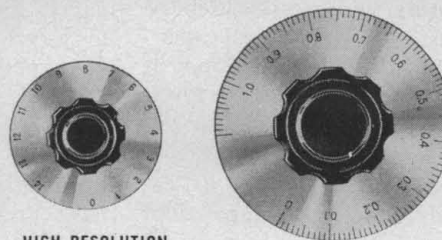
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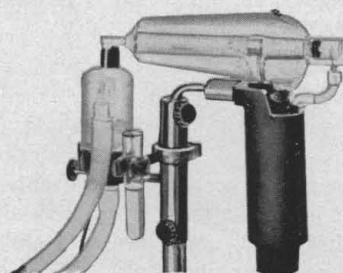
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their field of study is potentially the most dynamic of all. Too often they have been ignorant or even contemptuous of process, and to all appearances, involved mainly in the invention of complex and rather meaningless terminologies. But these taxonomists, anatomists, and ecologists do not express the essence of their specialties any more than does the molecular biologist who thinks all plants and animals are more or less identical except that they contain slightly different DNA's, or than the physiologist who has no knowledge of or interest in the functioning of the parts of his organism in any environment other than the laboratory incubator or the test tube.

For the society we live in to function and advance we need every encouragement, not only to biologists and other scientists, but also to musicians, artists, writers, sociologists, engineers, plain every-day working people, and others, with no peck-order intended. Similarly, all pertinent fields in biology must be encouraged if we are to maintain a healthy science and continue on really to understand and control the living world around us.

CHARLES C. DAVIS

*Department of Biology,
Western Reserve University*

Western Europe: Research and Development

I agree with your general observations on the rapidly advancing state of research and development in Western Europe [*Science* 140, 773 (17 May 1963)]. However, some of your comparisons regarding the present situation are probably not valid.

Commerce alone does not determine the relative technological position of nations, particularly when one of those nations has vastly different standards of external and internal modes of commerce. Your values for research costs in Europe are much too low. Perhaps the figure of one-fourth represents the situation as it was quite a number of years ago.

With respect to most of the parameters—size of the effort and generation of new ideas—the United States can certainly be said to be ahead of any nation in Europe. However, the Europeans have the advantage that they are seriously examining the question of the proper level of research and development expenditure in relation to eco-

conomic growth at a time when their research and development expenditures are still relatively low. Consequently, they may be able to make better use of future expenditures.

ARNOLD KRAMISH
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Tribute to F. R. Moulton

I often wonder whether the present officers of the AAAS, to say nothing of its members, realize the extent of their indebtedness to Forest Ray Moulton, with whom I had the privilege of working in the Association from 1943, when he was 71, until 1948, when he retired. He died in 1952.

It is not my intention here to write a biographical sketch of Moulton. I merely want to point out that Moulton in his 70's was still an enormously strong and able man, and was absolutely devoted to the advancement of the AAAS. Perhaps if I called him the de Gaulle of American science, I would convey briefly a fairly accurate impression of his characteristics. Moulton was admirable, but to most people not lovable, and he could be almost ruthless in his drive to build up the AAAS. Unfortunately, I think, he scorned the art of social diplomacy and lived a rather lonely life. However, such a man was needed to conduct negotiations for the purchase of *Science* and the *Scientific Monthly* from the Cattell estate.

Today *Science* belongs to the Association through Moulton's efforts; the headquarters building of the Association has its present fine location at Scott Circle because Moulton selected and procured the site; the excellence of the AAAS symposium series stems from his personal editorial work; and the solvency of the Association during his period was assured by his careful, some would say penurious, fiscal management. Remember that his were the days before government support of science became prevalent, that he had been born in a log cabin in Michigan, and that his distinguished career in celestial mechanics at the University of Chicago was the result of his native ability and tireless personal efforts.

I think of Moulton as the most rugged individualist I have known—the builder of the AAAS during a critical decade of its history. As such, it would seem fitting to remember and honor his

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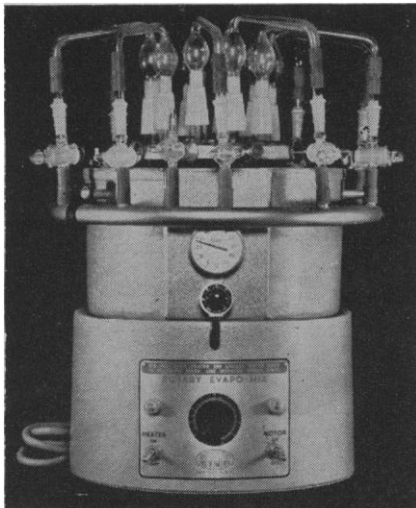
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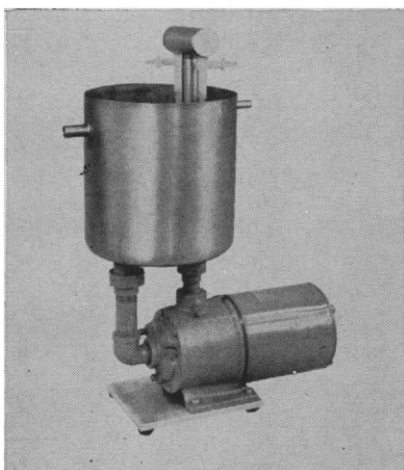
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name. Therefore, I propose that, at an appropriate time and with suitable ceremony, the headquarters building at 1515 Massachusetts Avenue be named Moulton Hall, and be so indicated on a plaque at the entrance.

FRANK L. CAMPBELL

*National Academy of Sciences—
National Research Council,
Washington, D.C.*

Scientist Reviewers Beware

A recent episode in professional reviewing, which has occurred in the present fever-heat atmosphere in which all discussions of race are being conducted, has highlighted a hazard about which I suspect many scientists, accustomed to reviewing for scientific journals, are not aware.

The episode in question, which stirred up a mare's nest of moral indignation, mutual recrimination, and accusation, resulted from the fact that Theodosius Dobzhansky followed a scientific reviewing ethic rather than a literary reviewing ethic when he wrote a critical review of Carleton Coon's book, *The Origin of Races*, at the request of the *Saturday Review*. In accordance with a practice of scientific courtesy, he sent a copy of his review manuscript to Coon. Coon responded by asking for the right to reply—again a correct response in the case of a review appearing in a scientific journal.

But in the case of a journal like the *Saturday Review*, it is incorrect to send a copy of the manuscript of a review anywhere else before the review has actually been published. Literary review journals have to guard against premature quotation by other publishers, and last-minute changes in makeup may mean that a review is not run at all.

The *Saturday Review*, in response to Coon's request, tried to arrange an interview with him, but by the time this was planned for, he had left for Europe. Meanwhile, another section of the *Saturday Review* had run some excerpts from the book.

Friends of Dobzhansky joined him in the belief that his review was being held up because of pressures against the review's content—an assumption that was not justified by the *Saturday Review's* record of liberalism. They began to write letters of protest, to which the *Saturday Review's* editors reacted with what they felt to be fully justified annoyance. As a result, the editors rejected

the review, which was in preparation for publication, and thus what had started out as a misunderstanding became a cause célèbre, in which the issues were still further clouded. Finally, the review itself, in an extended form, was published in the *Scientific American* ["A debatable account of the origin of races," *Sci. Am.* **208**, No. 2, 169 (1963)].

In investigating the whole affair I realized that, although I have reviewed for literary as well as for scientific journals all my professional life and would never send a review intended for a literary journal to anyone before its publication, nevertheless I had never articulated this rule.

As science comes closer to public issues and as scientists are asked to come out of their ivory towers of scientific reviewing, with its particular rules of scientific courtesy, it will be useful to remember that different sets of rules apply to the two kinds of reviewing. This is the more important in situations where technical difficulties may, quite unnecessarily, add fuel to the fires of legitimate controversy.

MARGARET MEAD

*American Museum of Natural History,
New York*

Whales and Cows: Stomach Capacity

In the book review of *Whales* by E. J. Slijper [*Science* **140**, 166 (12 Apr. 1963)] it is stated in the center of column 3 that "the stomach of a domestic cow does not hold 55 gallons." Apparently there was much in Slijper's book to criticize, but the accuracy of this particular statement is not one of them.

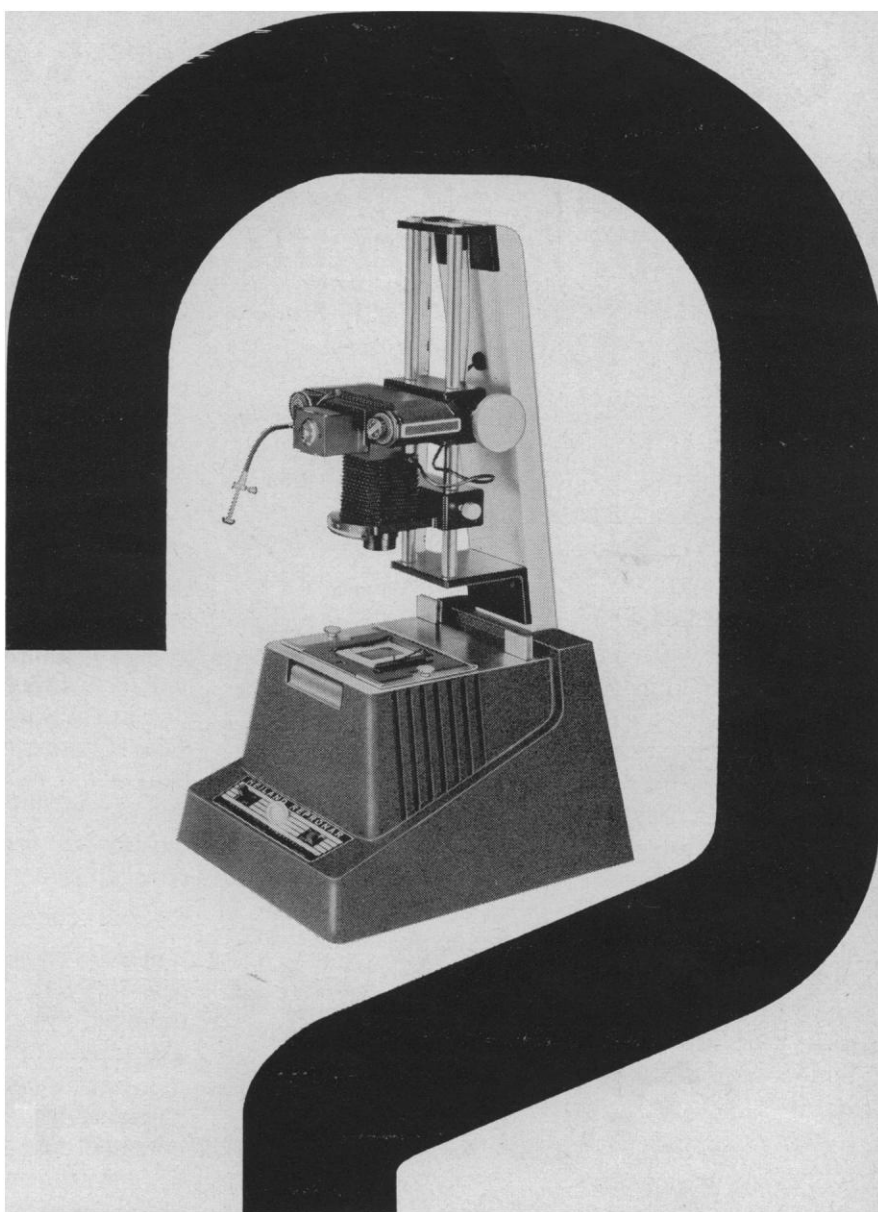
The stomach of the cow may be considered to consist of four parts: the rumen, reticulum, omasum, and abomasum. According to Sisson and Grossman in *Anatomy of the Domestic Animals*: "The capacity of the stomach varies greatly depending on the age and size of the animal. In cattle of medium size it holds 30 to 40 gallons, in large animals 40 to 60, in small 25 to 35."

A critical review is a worthwhile contribution. However, a reviewer can do himself discredit as well as the author if he is inaccurate or hypercritical.

ARTHUR FREEMAN

*American Veterinary Medical
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26 JULY 1963



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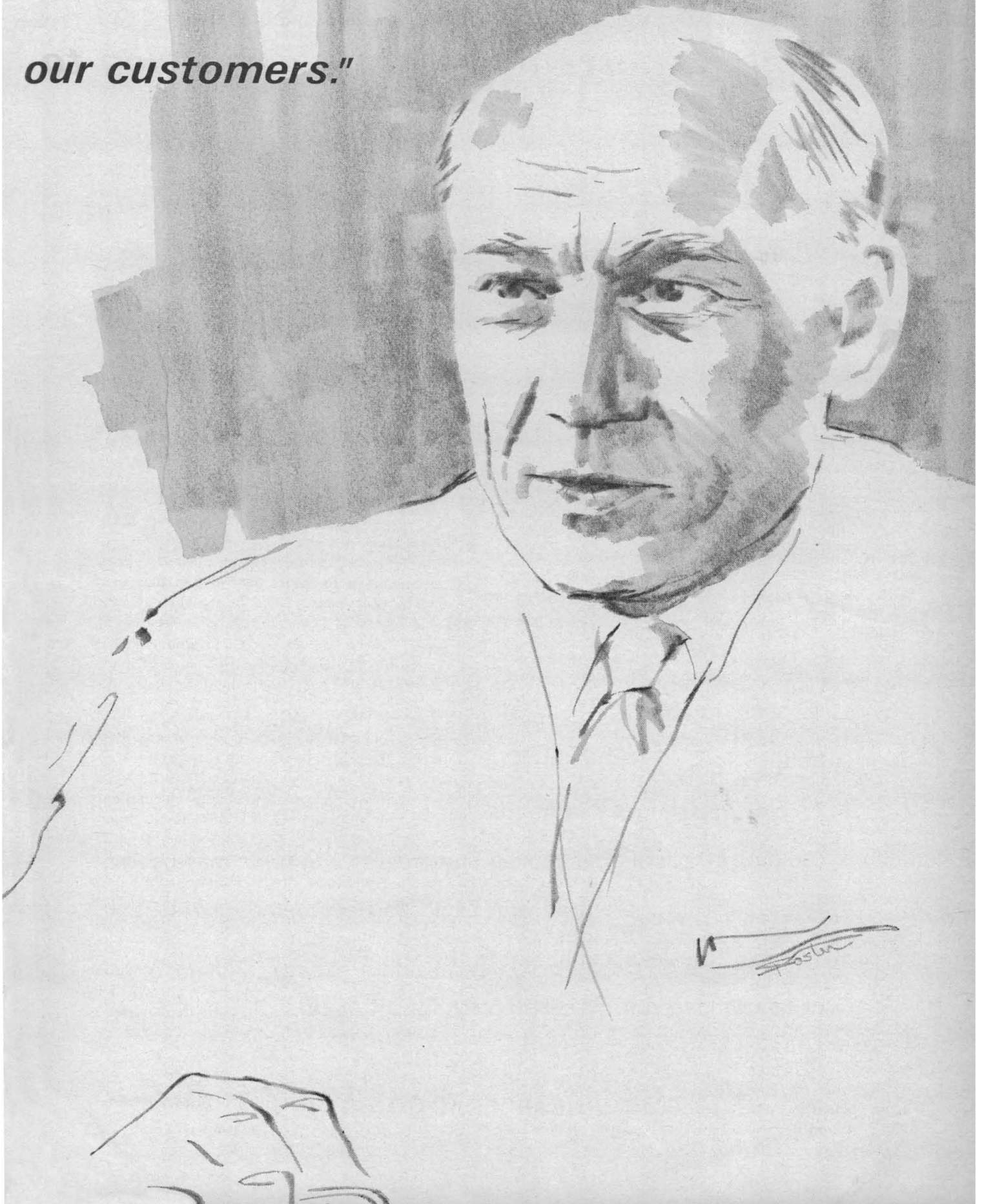
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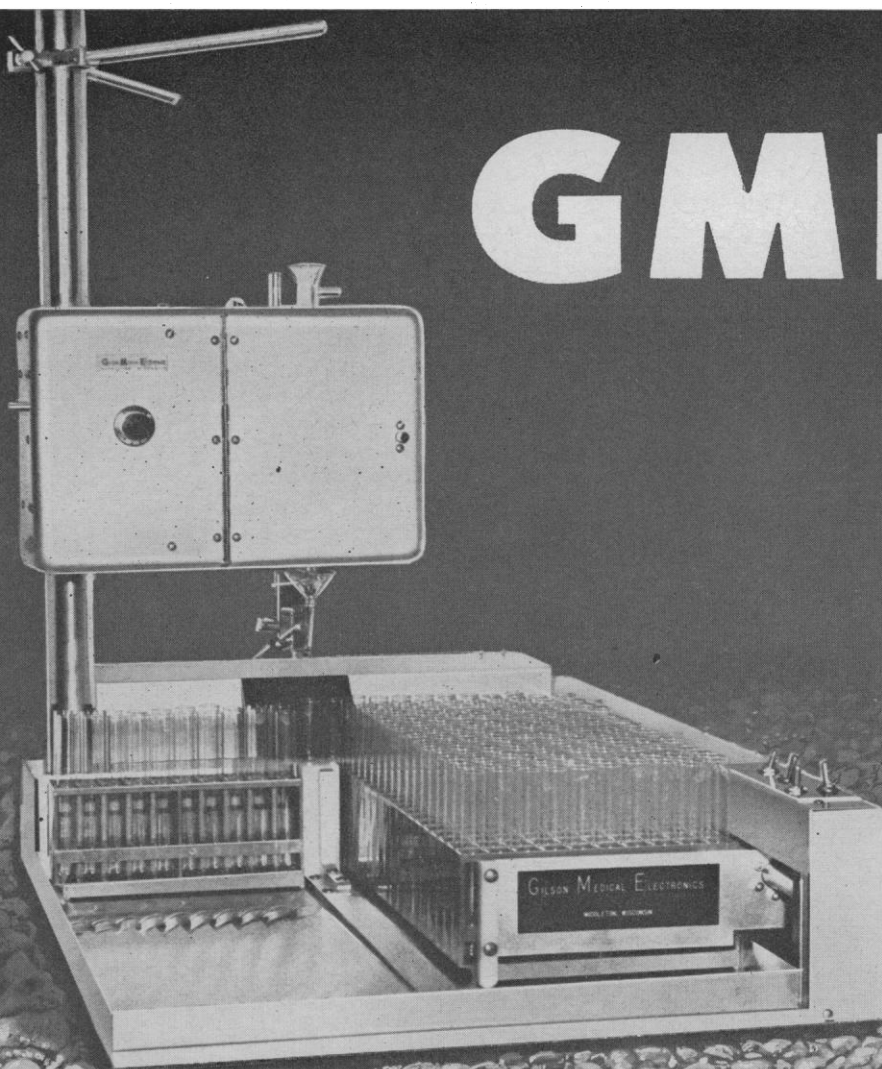
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Information Transfer and Retrieval

Keeping informed of new research results is a matter of concern to all who are engaged in science or technology. However, the magnitude of the problem and the mechanisms employed for the transfer and retrieval of information differ widely, depending on the kind of activity involved. For those engaged in efforts at the leading edges of scientific discovery, information retrieval presents no great problem. For those engaged in technology, and especially those concerned with patents, a more serious difficulty exists, one which has been described as an information crisis. This has received attention from the President's Science Adviser, Jerome Wiesner, and is currently the concern of a committee in Congress headed by Representative Pucinski of Illinois.

In some areas of fundamental research there is no crisis, for jet travel and the telephone permit fast and complete interchange of information. Consider the procedures of scientists who are leaders in a field such as molecular biology. These men (or women) quickly become aware of each other's work and come to form an invisible college. They keep each other informed of progress through visits, telephone calls, letters, and mimeographed preprints of papers. By common consent they publish in a limited number of journals. While they participate to a degree in the large national meetings, their favorite place of meeting is the small, closed symposium.

Membership in the "college" is informal and is won on the basis of scientific contributions. Young men achieve it most readily by working in a laboratory where the senior workers already belong. There they have an opportunity to learn early of new developments and current ideas. Nevertheless, a man of sufficient competence and imagination, no matter where he is working, can achieve membership through excellence.

Men who are active in a fast-moving field know that only a limited number of workers are likely to make significant discoveries, and that they themselves can keep abreast of new developments if they are in close contact with those few. They also know that colleagues with whom they are not in contact, and even newcomers, will publish their findings in perhaps a half dozen journals. It is not even necessary for each individual to scan this limited number of publications, for he will learn through the "grapevine" of anything particularly significant.

Another advantage possessed by a member of the "college" is the ability to readily evaluate the work of others. Through his own judgment and through consultation with others he can quickly identify those who do highly imaginative, reliable work and be warned of those who are careless. It is also easy for him to spot and disregard those who talk about, and publish repeatedly, the same limited body of facts, or variants of them.

The attitude of those who have ready access to new information relevant to their activities and who can obtain evaluated material of prime significance was expressed by one molecular biologist, who told me, "If all of human knowledge could be put on a computer and I could press a button and get all the information on DNA, I doubt that I would ever touch the button."

For those who are not on the "grapevine" or who wish to apply the results of basic research, the problem is quite different, and a well-conceived machine system of information retrieval would be useful. To be of maximum value, however, such a system would have to possess the speed and some of the capacities of evaluation already enjoyed by members of the invisible colleges.—P.H.A.



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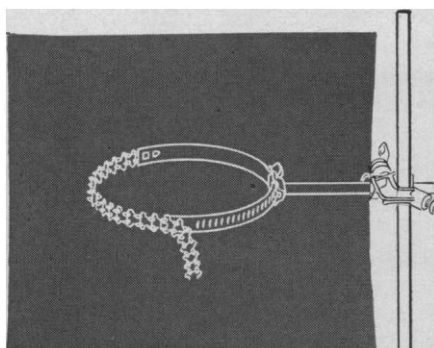
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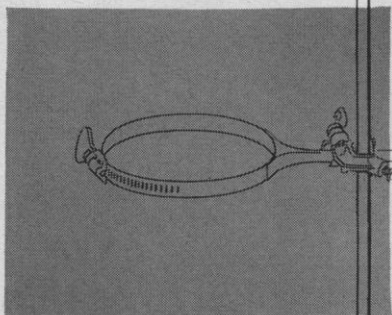
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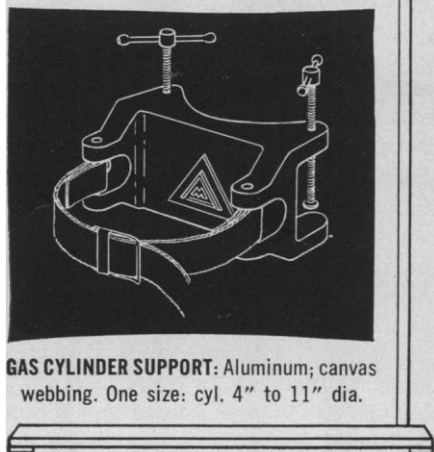
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and served to emphasize the difficulties involved in such studies and the necessity for a great number and a wide variety of measurements. These studies, including the investigation of adequate control populations in regions of lower natural radiation levels, have barely begun and it appeared clear that much more time and effort on the part of workers in many disciplines will be required to isolate any definitive environmental factors, of which natural radiation is only one.

The symposium was supported by the U.S. Atomic Energy Commission, Division of Radiological Health of the U.S. Public Health Service, and Rice University.

JOHN A. S. ADAMS
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August

19-30. **Macromolecules**, statistical theory, seminar, Hanover, N.H. (Dean of Summer Programs, P.O. Box 833, Hanover)

19-31. **Geodesy and Geophysics**, 13th general assembly, Berkeley, Calif. (W. E. Smith, AGU, 1515 Massachusetts Ave. NW, Washington 5)

20-23. Western **Electronic Show and Conf.**, San Francisco, Calif. (J. D. Noe, WESCON, 701 Welch Rd., San Francisco)

20-24. **Poultry Science Assoc.**, Stillwater, Okla. (W. E. Shaklee, Cooperative State Experiment Station Service, USDA, Washington 25)

20-26. **Psychology**, 17th intern. congr., Washington, D.C. (American Psychological Assoc., 1333 16th St. NW, Washington 6)

20-26. **Zoological Nomenclature**, intern. committee meeting, Washington, D.C. (W. E. China, British Museum of Natural History, Cromwell Rd., London S.W.1)

20-27. **Zoology**, 16th intern. congr., Washington, D.C. (Secretary of the Congress, Natl. Acad. of Sciences, 2101 Constitution Ave., NW, Washington 25)

21-23. **Biochemical Conf.**, Pacific Slope annual, Honolulu, Hawaii. (P. E. Wilcox, Dept. of Biochemistry, Univ. of Washington, Seattle 5)

21-29. International Conf. on **Population**, Ottawa, Ont., Canada. (B. Benjamin, Intern. Union for the Scientific Study of Population, General Register Office, Somerset House, London W.C.2, England)

22-24. National Council of Teachers of **Mathematics**, Pittsburgh, Pa. (E. G. Begle, Stanford Univ., Stanford, Calif.)

24-25. **Transactional Analysis**, first summer conf., Monterey, Calif. (E. Berne, Box 5747, Carmel, Calif.)

25-28. **Soil Conservation Soc. of America**, Logan, Utah. (H. W. Pritchard, Soil Conservation Soc., 7515 Northeast Ankeny Rd., Ankeny, Iowa)

25-29. **Medical Correctional Assoc.**, Portland, Ore. (F. L. Rouke, 14 Studio Arcade, Bronxville, N.Y.)

26-28. Simulation for **Aerospace Flight**, specialists meeting, Columbus, Ohio. (Inst. of the Aerospace Sciences, 2 E. 64 St., New York 21)

26-28. **Superconductivity**, intern. conf., Hamilton, N.Y. (R. W. Schmitt, General Electric Research Laboratory, P.O. Box 1088, Schenectady, N.Y.)

26-29. American **Sociological Assoc.**, Los Angeles, Calif. (T. Parsons, Dept. of Social Relations, Harvard Univ., Cambridge 38, Mass.)

26-30. American **Mathematical Soc.**, 68th summer, Boulder, Colo. (Mrs. R. Drew-Bear, Special Projects Dept., AMS, 190 Hope St., Providence 6, R.I.)

26-30. **Rheology**, 4th intern. congr., Providence, R.I. (R. S. Rivlin, Brown Univ., Providence 12)

26-30. **Solar Spectrum**, intern. symp., Utrecht, Netherlands. (C. de Jager, Theoretical Dept., Sterrewacht, Servaasbolwerk 13, Utrecht)

26-31. **Haematology**, European Soc., 9th congr. Lisbon, Portugal. (Secretary, Haematology Congr., Dept. of Haematology, Inst. of Tropical Medicine, Lisbon)

27-30. **Alaskan Science Conf.**, Anchorage. (A. H. Mick, Alaska Agricultural Experiment Station, Palmer)

27-30. American **Physiological Soc.**, Coral Gables, Fla. (M. Edwards, Physiology Dept., Univ. of Miami School of Medicine, Coral Gables 34)

27-30. **Computing Machinery Assoc.**, natl. conf., Denver, Colo. (F. P. Venditti, Univ. of Denver, Denver 10)

27-31. American Inst. of **Biological Sciences**, Amherst, Mass. (R. A. Jester, Dept. of Floriculture, Univ. of Massachusetts, Amherst)

27-4. **Automatic Control**, 2nd intern. congr., Basel, Switzerland. (A. von Schulthess, Wasserwerkstr. 53, Zurich 6, Switzerland)

28-31. **Electron Microscope Soc. of America**, 21st annual, Denver, Colo. (V. L. Van Breemen, Mercy Inst. for Biomedical Research, 2920 E. 16 Ave., Denver 6)

28-4. **British Assoc. for the Advancement of Science**, Aberdeen, Scotland. (Sir G. Allen, Burlington House, Piccadilly House, London, England)

29-30. **Solvation Phenomena**, symp., Calgary, Alberta, Canada. (P. J. Krueger, Dept. of Chemistry, Univ. of Alberta, Calgary)

29-31. **Pollen Physiology and Fertilization**, symp., Nijmegen, Netherlands. (H. F. Linskens, Dept. of Botany, Univ. of Nijmegen, Driehuizerweg 200, Nijmegen)

29-4. American **Psychological Assoc.**, Philadelphia, Pa. (E. B. Newman, Memorial Hall, Harvard Univ., Cambridge 38, Mass.)

30-1. **Pancreatic Islets**, intern. symp., Uppsala, Sweden. (S. Brolin, Univ. of Uppsala, Uppsala)

30-2. Individual **Psychology**, intern. congr., Paris, France. (H. Schaffer, 28 rue des Archives, Paris 4)